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1653

## RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/469,200

DATE: 04/26/2001

TIME: 11:07:05

Input Set : A:\3554.011sequence listing ASCII format.txt

Output Set: N:\CRF3\04262001\I469200.raw

3 <110> APPLICANT: Board of Regents of the University of Oklahoma  
 5 <120> TITLE OF INVENTION: NUCLEIC ACID ENCODING HYALURONAN SYNTHASE AND METHODS  
 6 OF USE  
 8 <130> FILE REFERENCE: 617022-7  
 C--> 10 <140> CURRENT APPLICATION NUMBER: US/09/469,200  
 C--> 11 <141> CURRENT FILING DATE: 1999-12-21  
 13 <150> PRIOR APPLICATION NUMBER: 60/080,414  
 14 <151> PRIOR FILING DATE: 1998-04-02  
 16 <150> PRIOR APPLICATION NUMBER: 60/178,851  
 17 <151> PRIOR FILING DATE: 1998-10-26  
 19 <160> NUMBER OF SEQ ID NOS: 29  
 21 <170> SOFTWARE: PatentIn Ver. 2.0  
 23 <210> SEQ ID NO: 1  
 24 <211> LENGTH: 972  
 25 <212> TYPE: PRT  
 26 <213> ORGANISM: Pasteurella multocida  
 28 <400> SEQUENCE: 1  
 29 Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Ser Asn Asp Tyr  
 30 1 5 10 15  
 32 Gln Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Ile Tyr Gly Arg  
 33 20 25 30  
 35 Lys Ile Val Glu Phe Gln Ile Thr Lys Cys Gln Glu Lys Leu Ser Ala  
 36 35 40 45  
 38 His Pro Ser Val Asn Ser Ala His Leu Ser Val Asn Lys Glu Glu Lys  
 39 50 55 60  
 41 Val Asn Val Cys Asp Ser Pro Leu Asp Ile Ala Thr Gln Leu Leu Leu  
 42 65 70 75 80  
 44 Ser Asn Val Lys Lys Leu Val Leu Ser Asp Ser Glu Lys Asn Thr Leu  
 45 85 90 95  
 47 Lys Asn Lys Trp Lys Leu Leu Thr Glu Lys Lys Ser Glu Asn Ala Glu  
 48 100 105 110  
 50 Val Arg Ala Val Ala Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val  
 51 115 120 125  
 53 Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Lys  
 54 130 135 140  
 56 Arg Lys Lys Arg Leu Gly Ile Lys Pro Glu His Gln His Val Gly Leu  
 57 145 150 155 160  
 59 Ser Ile Ile Val Thr Thr Phe Asn Arg Pro Ala Ile Leu Ser Ile Thr  
 60 165 170 175  
 62 Leu Ala Cys Leu Val Asn Gln Lys Thr His Tyr Pro Phe Glu Val Ile  
 63 180 185 190  
 65 Val Thr Asp Asp Gly Ser Gln Glu Asp Leu Ser Pro Ile Ile Arg Gln  
 66 195 200 205  
 68 Tyr Glu Asn Lys Leu Asp Ile Arg Tyr Val Arg Gln Lys Asp Asn Gly  
 69 210 215 220  
 71 Phe Gln Ala Ser Ala Ala Arg Asn Met Gly Leu Arg Leu Ala Lys Tyr  
 72 225 230 235 240

ENTERED

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```

74 Asp Phe Ile Gly Leu Leu Asp Cys Asp Met Ala Pro Asn Pro Leu Trp
75                245                250                255
77 Val His Ser Tyr Val Ala Glu Leu Leu Glu Asp Asp Asp Leu Thr Ile
78                260                265                270
80 Ile Gly Pro Arg Lys Tyr Ile Asp Thr Gln His Ile Asp Pro Lys Asp
81                275                280                285
83 Phe Leu Asn Asn Ala Ser Leu Leu Glu Ser Leu Pro Glu Val Lys Thr
84                290                295                300
86 Asn Asn Ser Val Ala Ala Lys Gly Glu Gly Thr Val Ser Leu Asp Trp
87 305                310                315                320
89 Arg Leu Glu Gln Phe Glu Lys Thr Glu Asn Leu Arg Leu Ser Asp Ser
90                325                330                335
92 Pro Phe Arg Phe Phe Ala Ala Gly Asn Val Ala Phe Ala Lys Lys Trp
93                340                345                350
95 Leu Asn Lys Ser Gly Phe Phe Asp Glu Glu Phe Asn His Trp Gly Gly
96                355                360                365
98 Glu Asp Val Glu Phe Gly Tyr Arg Leu Phe Arg Tyr Gly Ser Phe Phe
99                370                375                380
101 Lys Thr Ile Asp Gly Ile Met Ala Tyr His Gln Glu Pro Pro Gly Lys
102 385                390                395                400
104 Glu Asn Glu Thr Asp Arg Glu Ala Gly Lys Asn Ile Thr Leu Asp Ile
105                405                410                415
107 Met Arg Glu Lys Val Pro Tyr Ile Tyr Arg Lys Leu Leu Pro Ile Glu
108                420                425                430
110 Asp Ser His Ile Asn Arg Val Pro Leu Val Ser Ile Tyr Ile Pro Ala
111                435                440                445
113 Tyr Asn Cys Ala Asn Tyr Ile Gln Arg Cys Val Asp Ser Ala Leu Asn
114                450                455                460
116 Gln Thr Val Val Asp Leu Glu Val Cys Ile Cys Asn Asp Gly Ser Thr
117 465                470                475                480
119 Asp Asn Thr Leu Glu Val Ile Asn Lys Leu Tyr Gly Asn Asn Pro Arg
120                485                490                495
122 Val Arg Ile Met Ser Lys Pro Asn Gly Gly Ile Ala Ser Ala Ser Asn
123                500                505                510
125 Ala Ala Val Ser Phe Ala Lys Gly Tyr Tyr Ile Gly Gln Leu Asp Ser
126                515                520                525
128 Asp Asp Tyr Leu Glu Pro Asp Ala Val Glu Leu Cys Leu Lys Glu Phe
129                530                535                540
131 Leu Lys Asp Lys Thr Leu Ala Cys Val Tyr Thr Thr Asn Arg Asn Val
132 545                550                555                560
134 Asn Pro Asp Gly Ser Leu Ile Ala Asn Gly Tyr Asn Trp Pro Glu Phe
135                565                570                575
137 Ser Arg Glu Lys Leu Thr Thr Ala Met Ile Ala His His Phe Arg Met
138                580                585                590
140 Phe Thr Ile Arg Ala Trp His Leu Thr Asp Gly Phe Asn Glu Lys Ile
141                595                600                605
143 Glu Asn Ala Val Asp Tyr Asp Met Phe Leu Lys Leu Ser Glu Val Gly
144                610                615                620
146 Lys Phe Lys His Leu Asn Lys Ile Cys Tyr Asn Arg Val Leu His Gly

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## RAW SEQUENCE LISTING

DATE: 04/26/2001

PATENT APPLICATION: US/09/469,200

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Input Set : A:\3554.01\sequence listing ASCII format.txt

Output Set: N:\CRF3\04262001\I469200.raw

```

147 625          630          635          640
149 Asp Asn Thr Ser Ile Lys Lys Leu Gly Ile Gln Lys Lys Asn His Phe
150          645          650          655
152 Val Val Val Asn Gln Ser Leu Asn Arg Gln Gly Ile Thr Tyr Tyr Asn
153          660          665          670
155 Tyr Asp Glu Phe Asp Asp Leu Asp Glu Ser Arg Lys Tyr Ile Phe Asn
156          675          680          685
158 Lys Thr Ala Glu Tyr Gln Glu Glu Ile Asp Ile Leu Lys Asp Ile Lys
159          690          695          700
161 Ile Ile Gln Asn Lys Asp Ala Lys Ile Ala Val Ser Ile Phe Tyr Pro
162 705          710          715          720
164 Asn Thr Leu Asn Gly Leu Val Lys Lys Leu Asn Asn Ile Ile Glu Tyr
165          725          730          735
167 Asn Lys Asn Ile Phe Val Ile Val Leu His Val Asp Lys Asn His Leu
168          740          745          750
170 Thr Pro Asp Ile Lys Lys Glu Ile Leu Ala Phe Tyr His Lys His Gln
171          755          760          765
173 Val Asn Ile Leu Leu Asn Asn Asp Ile Ser Tyr Tyr Thr Ser Asn Arg
174          770          775          780
176 Leu Ile Lys Thr Glu Ala His Leu Ser Asn Ile Asn Lys Leu Ser Gln
177 785          790          795          800
179 Leu Asn Leu Asn Cys Glu Tyr Ile Ile Phe Asp Asn His Asp Ser Leu
180          805          810          815
182 Phe Val Lys Asn Asp Ser Tyr Ala Tyr Met Lys Lys Tyr Asp Val Gly
183          820          825          830
185 Met Asn Phe Ser Ala Leu Thr His Asp Trp Ile Glu Lys Ile Asn Ala
186          835          840          845
188 His Pro Pro Phe Lys Lys Leu Ile Lys Thr Tyr Phe Asn Asp Asn Asp
189          850          855          860
191 Leu Lys Ser Met Asn Val Lys Gly Ala Ser Gln Gly Met Phe Met Thr
192 865          870          875          880
194 Tyr Ala Leu Ala His Glu Leu Leu Thr Ile Ile Lys Glu Val Ile Thr
195          885          890          895
197 Ser Cys Gln Ser Ile Asp Ser Val Pro Glu Tyr Asn Thr Glu Asp Ile
198          900          905          910
200 Trp Phe Gln Phe Ala Leu Leu Ile Leu Glu Lys Lys Thr Gly His Val
201          915          920          925
203 Phe Asn Lys Thr Ser Thr Leu Thr Tyr Met Pro Trp Glu Arg Lys Leu
204          930          935          940
206 Gln Trp Thr Asn Glu Gln Ile Glu Ser Ala Lys Arg Gly Glu Asn Ile
207 945          950          955          960
209 Pro Val Asn Lys Phe Ile Ile Asn Ser Ile Thr Leu
210          965          970
213 <210> SEQ ID NO: 2
214 <211> LENGTH: 2937
215 <212> TYPE: DNA
216 <213> ORGANISM: Pasteurella multocida
218 <400> SEQUENCE: 2
219 attttttaag gacagaaaat gaatacatta tcacaagcaa taaaagcata taacagcaat 60

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## RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/469,200

DATE: 04/26/2001

TIME: 11:07:05

Input Set : A:\3554.011sequence listing ASCII format.txt

Output Set: N:\CRF3\04262001\I469200.raw

```

220 gactatcaat tagcactcaa attattttgaa aagtcggcgg aaatctatgg acggaaaatt 120
221 gttgaatttc aaattaccaa atgccaagaa aaactctcag cacatccttc tgttaattca 180
222 gcacatcttt ctgtaaataa agaagaaaaa gtcaatgttt gcgatagtcg gttagatatt 240
223 gcaacacaac tgttactttc caacgtaaaa aaattagtag tttctgactc ggaaaaaac 300
224 acgttaaaaa ataaatggaa attgctcact gagaagaaat ctgaaaatgc ggaggtaaga 360
225 gcggtcgccc ttgtaccaa agattttccc aaagatctgg ttttagcgcc tttacctgat 420
226 catgttaatg attttacatg gtacaaaaag cgaaagaaaa gacttggcat aaaacctgaa 480
227 catcaacatg ttggctcttc tattatcggt acaacattca atcgaccagc aattttatcg 540
228 attacattag cctgttttagt aaacccaaaa acacattacc cgtttgaagt tatcgtgaca 600
229 gatgatggta gtcaggaaga tctatcaccg atcattcgcc aatatgaaaa taaattggat 660
230 attcgctacg tcagacaaaa agataacggg tttcaagcca gtgcgctcg gaatatggga 720
231 ttacgcttag caaaatatga ctttattggc ttactcgact gtgatattgg gccaaatcca 780
232 ttatgggttc attcttatgt tgcagagcta ttagaagatg atgatttaac aatcattggg 840
233 ccaagaaaat acatcgatac acaacatatt gacccaaaag acttcttaaa taacgcgagt 900
234 ttgcttgaat cattaccaga agtgaaaacc aataatagtg ttgcccgaag aggggaagga 960
235 acagtttctc tggattggcg cttagaacaa ttcgaaaaaa cagaaaatct ccgcttatcc 1020
236 gattcgcttc tccgtttttt tgcggcgggt aatgttgctt tcgctaaaaa atggctaaat 1080
237 aaatccgggt tctttgatga ggaatttaat cactgggggtg gagaagatgt ggaatttggg 1140
238 tatcgcttat tccgttacgg tagtttcttt aaaactattg atggcattat ggcctaccat 1200
239 caagagccac caggtaaaga aaatgaaacc gatcgtgaag cgggaaaaaa tattacgctc 1260
240 gatattatga gagaaaaggt cccttatatc tatagaaac ttttaccaat agaagattcg 1320
241 catatcaata gtagctcttt agtttcaatt tatatccag cttataactg tgcaaacat 1380
242 attcaacggt gcgtagatag tgactgaat cagactgttg ttgatctoga ggtttgtatt 1440
243 tgtaacgatg gttcaacaga taatacctta gaagtgatca ataagcttta tggtaataat 1500
244 cctagggtac gcatcatgtc taaaccaa at ggcggaatag cctcagcatc aaatgcagcc 1560
245 gtttcttttg cttaaaggta ttacattggg cagtttagatt cagatgatta tcttgagcct 1620
246 gatgcagttg aactgtgttt aaaagaattt taaaagata aaacgctagc ttgtgtttat 1680
247 accactaata gaaacgtcaa tccggatggg agcttaatcg ctaatgggta caattggcca 1740
248 gaattttcac gagaaaaact cacaacggct atgattgttc accacttttag aatgttcacg 1800
249 attagagctt ggcatttaac tgatggatc aatgaaaaaa ttgaaaatgc cgtagactat 1860
250 gacatgttcc tcaaactcag tgaagtggg aaatttaaac atcttaataa aatctgctat 1920
251 aaccgtgtat tacatggtga taacacatca attaagaaac ttggcattca aaagaaaaac 1980
252 cattttgttg tagtcaatca gtcattaaat agacaaggca taacttatta taattatgac 2040
253 gaatttgatg atttagatga aagtagaaag tatattttca ataaaaaccg tgaatatcaa 2100
254 gaagagattg atatcttaaa agatattaaa atcatccaga ataaagatgc caaatcgca 2160
255 gtcagtattt tttatcccaa tacattaaac ggcttagtga aaaaactaaa caatattatt 2220
256 gaatataata aaaatatatt cgttattgtt ctacatgttg ataagaatca tcttacacca 2280
257 gatatacaaa aagaaatact agccttctat cataaacatc aagtgaatat tttactaaat 2340
258 aatgatattc catattacac gagtaataga ttaataaaaa ctgaggcgca ttttaagtaat 2400
259 attataaat taagtcagtt aaatctaaat tgtgaataca tcatttttga taatcatgac 2460
260 agcctattcg ttaaaaatga cagctatgct tatatgaaaa aatatgatgt cggcatgaat 2520
261 ttctcagcat taacacatga ttggatcgag aaaatcaatg cgcattccacc atttaaaaag 2580
262 ctcatataaa cttattttta tgacaatgac ttaaaaagta tgaatgtgaa aggggcatca 2640
263 caaggatagt ttatgacgta tgcgctagcg catgagcttc tgacgattat taaagaagtc 2700
264 atcacatctt gccagtcaat tgatagtgtg ccagaatata acactgagga tatttggttc 2760
265 caatttgcac ttttaatctt agaaaagaaa accggccatg tatttaataa aacatogacc 2820
266 ctgacttata tgccttggga acgaaaatta caatggacaa atgaacaaat tgaaagtgca 2880
267 aaaagaggag aaaatatacc tgtaacaag ttcattatta atagtataac tctataa 2937
269 <210> SEQ ID NO: 3

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## RAW SEQUENCE LISTING

PATENT APPLICATION: US/09/469,200

DATE: 04/26/2001

TIME: 11:07:05

Input Set : A:\3554.011sequence listing ASCII format.txt

Output Set: N:\CRF3\04262001\I469200.raw

```

270 <211> LENGTH: 972
271 <212> TYPE: PRT
272 <213> ORGANISM: Pasteurella multocida
274 <400> SEQUENCE: 3
275 Met Asn Thr Leu Ser Gln Ala Ile Lys Ala Tyr Asn Cys Asn Asp Tyr
276   1             5             10             15
278 Glu Leu Ala Leu Lys Leu Phe Glu Lys Ser Ala Glu Thr Tyr Gly Arg
279             20             25             30
281 Lys Ile Val Glu Phe Gln Ile Ile Lys Cys Lys Glu Lys Leu Ser Thr
282             35             40             45
284 Asn Ser Tyr Val Ser Glu Asp Asn Ser Tyr Val Ser Glu Asp Lys Lys
285             50             55             60
287 Asn Ser Val Cys Asp Ser Ser Leu Asp Ile Ala Thr Gln Leu Leu Ile
288   65             70             75             80
290 Ser Asn Val Lys Lys Leu Thr Leu Ser Glu Ser Glu Lys Asn Ser Leu
291             85             90             95
293 Lys Asn Lys Trp Lys Ser Ile Thr Gly Lys Lys Ser Glu Asn Ala Glu
294             100            105            110
296 Ile Arg Lys Val Glu Leu Val Pro Lys Asp Phe Pro Lys Asp Leu Val
297             115            120            125
299 Leu Ala Pro Leu Pro Asp His Val Asn Asp Phe Thr Trp Tyr Lys Asn
300             130            135            140
302 Arg Lys Lys Arg Leu Gly Ile Lys Pro Val Asn Lys Asn Ile Gly Leu
303   145            150            155            160
305 Ser Ile Ile Ile Pro Thr Phe Asn Arg Ser Arg Ile Leu Asp Ile Thr
306             165            170            175
308 Leu Ala Cys Leu Val Asn Gln Lys Thr Asn Tyr Pro Phe Glu Val Val
309             180            185            190
311 Val Ala Asp Asp Gly Ser Lys Glu Asn Leu Leu Thr Ile Val Gln Lys
312             195            200            205
314 Tyr Glu Gln Lys Leu Asp Ile Lys Tyr Val Arg Gln Lys Asp Tyr Gly
315             210            215            220
317 Tyr Gln Leu Cys Ala Val Arg Asn Leu Gly Leu Arg Thr Ala Lys Tyr
318   225            230            235            240
320 Asp Phe Val Ser Ile Leu Asp Cys Asp Met Ala Pro Gln Gln Leu Trp
321             245            250            255
323 Val His Ser Tyr Leu Thr Glu Leu Leu Glu Asp Ile Asp Ile Val Leu
324             260            265            270
326 Ile Gly Pro Arg Lys Tyr Val Asp Thr His Asn Ile Thr Ala Glu Gln
327             275            280            285
329 Phe Leu Asn Asp Pro Tyr Leu Ile Glu Ser Leu Pro Glu Thr Ala Thr
330             290            295            300
332 Asn Asn Asn Pro Ser Ile Thr Ser Lys Gly Asn Ile Ser Leu Asp Trp
333   305            310            315            320
335 Arg Leu Glu His Phe Lys Lys Thr Asp Asn Leu Arg Leu Cys Asp Ser
336             325            330            335
338 Pro Phe Arg Tyr Phe Val Ala Gly Asn Val Ala Phe Ser Lys Glu Trp
339             340            345            350
341 Leu Asn Lys Val Gly Trp Phe Asp Glu Glu Phe Asn His Trp Gly Gly

```

**Please Note:**

Us of n and/ r Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a c rresponding xplanati n is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

## VERIFICATION SUMMARY

PATENT APPLICATION: US/09/469,200

DATE: 04/26/2001

TIME: 11:07:06

Input Set : A:\3554.011sequence listing ASCII format.txt

Output Set: N:\CRF3\04262001\I469200.raw

L:10 M:270 C: Current Application Number differs, Replaced Current Application Number  
L:11 M:271 C: Current Filing Date differs, Replaced Current Filing Date  
L:1019 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1025 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1031 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1037 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1043 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1046 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1049 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1052 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1055 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1058 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1061 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1067 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1070 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1073 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1076 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1079 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1091 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1097 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1154 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1193 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:9  
L:1384 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15  
L:1387 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15  
L:1390 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:15  
L:1465 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:18  
L:1468 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:18  
L:1486 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:19  
L:1514 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:20  
L:1532 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:21  
L:1565 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:22  
L:1651 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:29